

A NEW *STIPA* (POACEAE: STIPEAE) FROM IDAHO AND NEVADA

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ABSTRACT

*Stipa shoshoneana* is a new grass species principally from east-central Idaho, but with a disjunct population in the Belted Range of southern Nevada. *Stipa shoshoneana* is allied with Eurasian species of *Stipa* L. sect. *Lasiagrostis* (Link) Hackel, and with North American stipoids historically assigned to *Oryzopsis sensu amplo*. Vegetative features, panicles, glumes, anthoecia, and flowers approximate *Stipa canadensis* Poir., but the lemma callus and awn morphology resemble *Oryzopsis pungens* (Torr.) A.S. Hitchc.

INTRODUCTION

During 1978, three grass specimens were collected (*D. M. Henderson 4432*) within the Salmon River Canyon of Lemhi County, Idaho, that possess a unique combination of micro- and macromorphological character-states, but with clear alliance to Eurasian species of *Stipa* L. sect. *Lasiagrostis* (Link) Hackel ( $\equiv$  *Achnatherum* P. Beauv. *sensu stricto*), and to a group of North American stipoids historically assigned to *Oryzopsis sensu amplo*. Vegetative features, spikelet arrangement, glumes, anthoecia (lemma and palea without callus or awn) and flowers approximate *Stipa canadensis* Poir. ( $\equiv$  *Oryzopsis canadensis* [Poir.] Torr.), but the lemma callus and awn parallel *Oryzopsis pungens* (Torr.) A. S. Hitchc.

Over 200 subsequently collected specimens of this enigmatic grass confirmed the presence of more than just a few anomalous plants. Fourteen widely separated populations are known within the Salmon River Mountains and Lemhi Range of east-central Idaho, and a small disjunct population exists in the Belted Range of southcentral Nevada.

The known geographical range of this undescribed species occurs beyond the spatial extent of any close tribal relative. *Stipa canadensis* and *Oryzopsis pungens*, both species of Canada and the northeastern United States, are presently unknown within Idaho, although both occur nearby in southern British Columbia and Alberta. *Oryzopsis micranthum* (Trin. & Rupr.) Thurber ( $\equiv$  *Piptatherum micranthum* [Trin. & Rupr.] Barkworth) is locally frequent to common throughout the Great Basin, central Rocky Mountains, and northern Great Plains, but is known within Idaho from only one site in southwestern Clark County (Moseley and Henderson 1994) ca. 30 km by air northeast across Birch Creek Valley from the closest population of

the undescribed species. *Oryzopsis exigua* Thurber is present at several sites across the Salmon River Mountains and Lemhi Range, but has not been found with the undescribed species.

Twelve other stipoids occur within the geographical extent of the undescribed species: *Stipa comata* Trin. & Rupr. ( $\equiv$  *Hesperostipa comata* [Trin. & Rupr.] Barkworth); *S. viridula* Trin. ( $\equiv$  *Nassella viridula* [Trin.] Barkworth); *S. hymenoides* R. & S.; *S. lettermanii* Vasey; *S. nelsonii* Scribn.; *S. nevadensis* B. L. Johnson; *S. occidentalis* Thurber; *S. pinetorum* M. E. Jones; *S. richardsonii* Link; *S. thurberiana* Piper; *S. webberi* (Thurber) B. L. Johnson; and *Oryzopsis swallenii* C. L. Hitchcock & Spellenberg. Note that the last ten species were all recombined in *Achnatherum* by Barkworth (1993). The undescribed species is, however, ecologically segregated from all twelve, as it occurs only on or at the base of near-vertical cliffs not occupied by any other stipoid.

Although these populations from east-central Idaho and southcentral Nevada constitute a previously undescribed species, ready assignment to *Oryzopsis* is now incongruous with recent generic realignments in the American Stipeae (Barkworth 1983, 1990, 1993; Barkworth and Everett 1987) that 1) excluded *Stipa* L. from North and South America; 2) treated *Oryzopsis* as a unispecific genus comprising only *O. asperifolia* Michx.; 3) reassigned several North American *Oryzopsis* to other genera; and 4) temporarily retained *S. canadensis*, *O. exigua*, and *O. pungens* as an informally recognized group, "Boreobtusae", with uncertain generic affinity. Anthoecial morphology and lemma epidermal cell patterns expressed by the "Boreobtusae" are traceable to Miocene stipoids of present-day Nebraska (Thomasson 1980).

For the past decade, we have delayed the formal naming of this new species while these generic realignments have transpired. Without question, Stipeae systematics are very complex and likely involve reticulate evolution among ancestral ge-

<sup>1</sup> Deceased 1996. During 1993 and 1994, Henderson participated in the writing and editing of previous drafts.

names, as first discussed by Johnson (1945, 1972). The recognition of *Oryzopsis sensu amplo* has long been problematic owing to the obvious heterogeneity within the genus, and to the lack of consistent macromorphological difference from *Stipa sensu amplo* (Johnson 1945, 1972; Hoover 1966; Hitchcock and Spellenberg 1968; Spellenberg and Mehlenbacher 1971; Maze 1972; Kam and Maze 1974; Freitag 1975, 1985; Barkworth and Everett 1987). While it is clear that the North American "Boreobtusae" are only partially similar in macromorphology to *O. asperifolia*, an alternative generic grouping is not readily evident, as species of "Boreobtusae" are macromorphologically dissimilar.

Obvious qualitative differences in floral, spikelet, and vegetative morphology exist among the four species of "Boreobtusae," including the undescribed species. Both *O. pungens* ( $2n=22$ , Johnson 1945) and *O. exigua* ( $2n=22$ , Hitchcock and Spellenberg 1968) share with *O. asperifolia* ( $2n=46$ , Johnson 1945;  $2n=48$ , Bowden 1960) the combination of a fused style column bearing two or three stigmata, together with obovate glumes both shorter than or equal to the lemma body apex and divaricate at fruit dissemination. However, the florets of *O. pungens* and *O. exigua* differ markedly from each other (Table 1). Both *S. canadensis* and the undescribed species have free styles along with elliptical glumes longer than the lemma body apex and non-divaricate at fruit dissemination. But again, the florets of *S. canadensis* and the undescribed species are otherwise dissimilar (Table 1).

To better evaluate taxonomic placement of both the enigmatic "Boreobtusae" and the undescribed species, we reassessed the central argument espoused by Barkworth and Everett (1987) for generic monophyly as based on putatively autapomorphic lemma epidermal cell patterns first discussed by Thomasson (1976, 1978a).

#### METHODS

Laminar, lemmatal, and paleal abaxial epidermal patterns were observed from material prepared following the sodium hydroxide/chlorazol black clearing/staining method detailed by Thomasson (1978b). Descriptions of all laminar and lemmatal preparations follow Ellis (1976, 1979). Embryos were dissected from mature fruits first immersed in boiling water removed from a hot plate and then left to cool overnight. Mitotic chromosome counts were made upon root-tips removed from fruits germinated on filter paper in petri dishes, pretreated in distilled water vials kept on ice for 48 hours, and subsequently fixed/stained in aceto-orcein. Meiotic counts were obtained from anthers fixed in 3:1 ethanol:acetic acid and stained in aceto-carmin. Observations and drawings were made through a Zeiss Standard 18 microscope with a camera-lucida attachment. Voucher specimens for chromosome counts are deposited at CAS.

TABLE 1. SPECIES OF "BOREOBTUSAE".

	<i>Stipa shoshoneana</i>	<i>Stipa canadensis</i>	<i>Oryzopsis pungens</i>	<i>Oryzopsis exigua</i>
Proximal glume length	Longer than lemma body apex	Longer than lemma body apex	Shorter than lemma body apex	Shorter than lemma body apex
Anthoecium profile in fruit	Obovate	Obovate	Obovate	Elliptic
Lemma awn	subterminal, caducous, 1—2.5 mm long, $\pm$ straight spirally contorted < 1 revolution	terminal, persistent, 10—20 mm long, twice-geniculate, proximal segment spirally contorted > 2 revolutions	subterminal, caducous, 1—2.5 mm long, $\pm$ straight, spirally contorted < 1 revolution	dorsal, somewhat persistent, 3—8 mm long, once-geniculate, proximal segment spirally contorted < 1 revolution
Lodicules	3	3	3	2 (3)
Anthers	penicillate, 1.5—2.2 mm long	glabrate, 1.5—2.0 mm long	glabrate, 1.5—2.0 mm long	penicillate, 1.5—3.0 mm long
Styles	2, free throughout	2, free throughout	2, fused proximally	3, fused proximally
Stigmata	2, plumose, exserted laterally	2, plumose, exserted laterally	2, papillate, exserted apically	3, papillate, exserted apically
2n =	20 (This paper)	22 (Johnson 1945; Spellenberg 1970)	22 (Johnson 1945) 24 (Bowden 1960; Löve and Löve 1981)	22 (Hitchcock and Spellenberg 1968)

For our morphometric comparisons among "Boreobtusae" species, we examined and measured 204 specimens of the undescribed species, 64 specimens of *O. exigua* at ID, IDS, and UTC, and 470 specimens of other "Boreobtusae" (76 *S. canadensis*, 157 *O. micrantha*, and 237 *O. pungens*), borrowed from CAN, MIN, and RM.

#### RESULTS AND DISCUSSION

A discussion of generic relationships and realignments will be presented in another paper. In brief, we conclude that the undescribed species and *S. canadensis* are probably best placed with species of *Stipa* L. sect. *Lasiagrostis* (Link) Hackel ( $\equiv$  *Achnatherum* P. Beauv. *sensu stricto*). As for the placement of *O. exigua* and *O. pungens*, we remain at an impasse. If both are transferred to *Stipa* or to *Achnatherum*, then either genus would incorporate species combining fused styles and short glumes, making the exclusion of *O. asperifolia*, the genericity of *Oryzopsis*, even less-tenable. Perhaps both *O. exigua* and *O. pungens* should remain in *Oryzopsis* despite their incongruities otherwise with *O. asperifolia*.

*Achnatherum sensu stricto*, the greatly enlarged and heterogeneous *Achnatherum sensu* Barkworth (1993), and the newly recognized Australian segregate genus *Austrostipa* S.W.L. Jacobs & J. Everett (1996), form a macromorphological continuum with *Stipa*; and are not globally circumscribable Linnean genera with any greater coherence or predictive utility than *Stipa sensu amplo*. Although others may emphasize differences among modes of variation by segregating smaller genera, we choose to recognize the continuum among these modes by using subgenera within *Stipa sensu amplo*, as did Freitag (1975), Clayton and Renvoize (1986), and recently Vázquez and Devesa (1996).

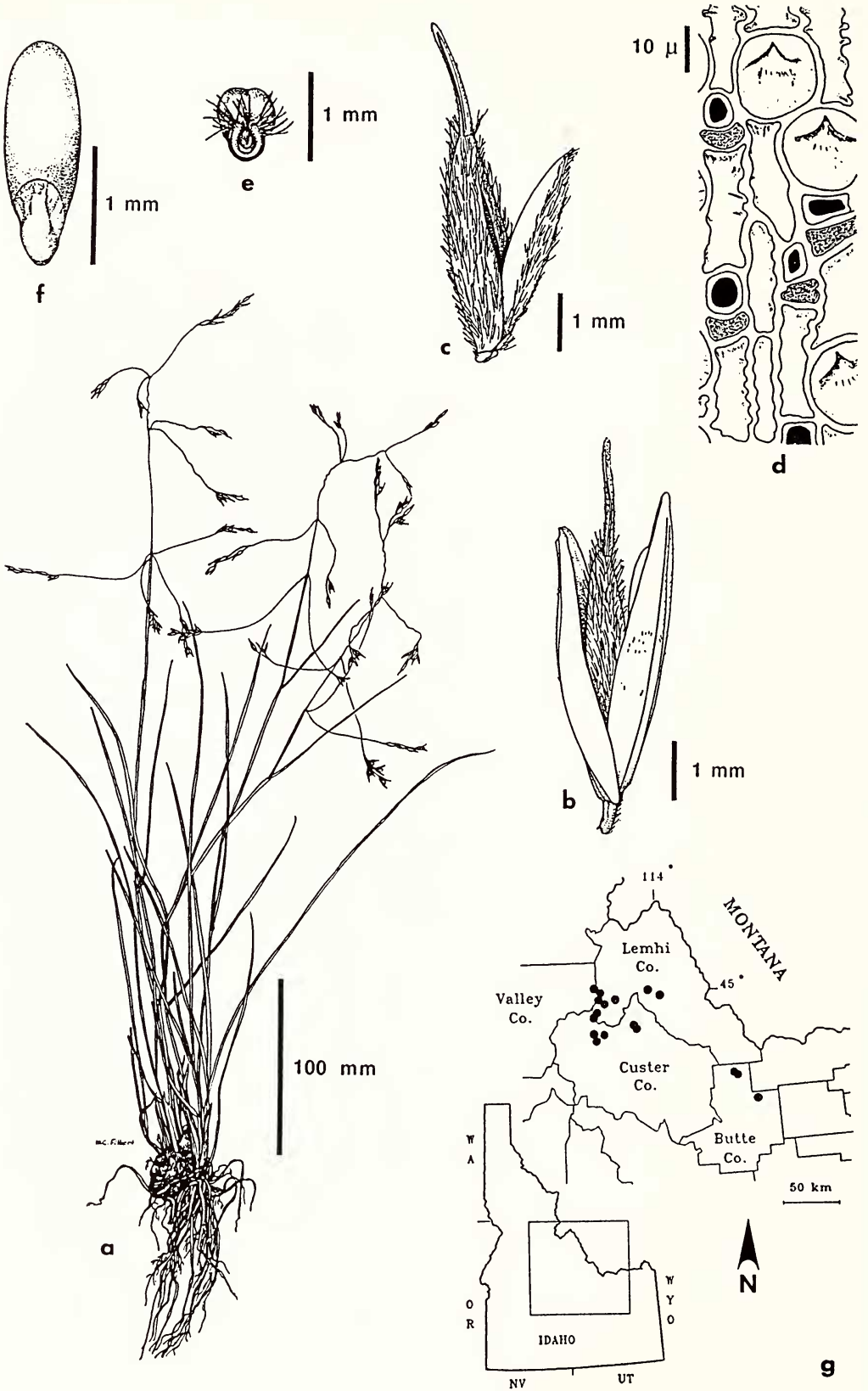
We anticipate that others will likely recombine this new species in segregate genera. Thus, we have selected a specific epithet that presents no nomenclatural barrier to direct transfers. Table 1, and a phenetic key, enable discrimination of the new species from similar regional stipoids.

*Stipa shoshoneana* Curto & D.M. Henderson, sp. nov. (Fig. 1). —TYPE: USA, Idaho, Salmon River Mts, ca. 15 km N of Challis, Morgan Creek Canyon ca. 7 km NW of US Hwy 93, near 44°39'47"N, 114°13'19"W, Gooseberry Creek 7.5 min quadrangle, T15N R19E S4 SW¼ of NE¼, el. ca. 1675 m, aspect SW, along N side of road in cracks of near vertical cliffs with *Cercocarpus ledifolius* Nutt., *Heuchera grossularifolia* Rydb., *Elymus spicatus* (Pursh) Gould, and *Poa interior* Rydb., 30 June 1987, *L. Eno* 17 (holotype: CAS; isotypes: BRY, ID, K, MIN, MO, NY, RM, UC, US, UTC, WTU; all to be distributed).

*Stipa canadensis* Poir. affinis, cujus habitum, an-

thoecia, et flores habet, sed differt callis lemmatum brevibus, aristas curtis caducis, antheris penicillatis, et chromosomatum numero aequante 20.

*Plants* rhizocarpic, iteroparous perennials. *Culms* herbaceous, 20–50 cm tall, densely tufted, slender, geniculate or ascending to erect; unbranched distally; nodes 2–3, glabrate, internodes hollow, antrorsely scabridulous; innovations intravaginal. *Leaves* mostly basal, few cauline; vernation convolute. *Sheaths* exauriculate; margins free; cross-section rounded; transverse septae absent; abaxial surface scabridulous. *Ligules* adaxial; membranous throughout; 1.8–5.5 mm long, apex acute, often lacerate. *Lamina* narrowly elongate, the length:width ratio > 30:1; planar or involute with drying, stiff, scabridulous along veins and margins. *Synflorescences* terminal, ebracteate or with a solitary linear bract at the proximal nodes; paniculate, ultimately diffuse, rachis and branches persistent; rachis nodes 3–7; rachis 33–220 mm long; most-proximal rachis internode 0.5–63.0 mm long; branches persistent, terminating at spikelets, slender to subcapillary, irregularly quadrangular, scabridulous; primary branches 1–2(–4) per node, most-proximal primary branches 18–116 mm long, distance to initial secondary branch 4–76 mm long; reflexed 90°–270°, bearing axillary pulvini; secondary and tertiary branching strictly dichotomous, branches bearing axillary pulvini and divaricate pre- and post-anthesis; penultimate and ultimate branches addressed. *Spikelets* borne as distinctly pedicellate monads, addressed in fruit; florets and flowers 1, bisexual; 3.3–5.3 mm long excluding lemma awn; pre-anthesis anthoecial profile elliptical, obovate in fruit; pre-anthesis anthoecial compression subterete, somewhat dorsoventrally compressed in fruit; rachilla terminating at floret attachment; disarticulation distal to the glumes. *Glumes* two, persistent, size and shape subequal, both extending beyond lemma body apex, rounded abaxially, membranous to chartaceous, evident veins 1–9, green and purple proximally, colorless distally, glabrate or with midvein scabridulous distally; proximal (first or lower) glume 3.2–5.1 mm long, profile asymmetrically lanceolate or oblongly lanceolate, apex acute to acuminate, awnless; distal (second or upper) glume 3.3–5.3 mm long, profile asymmetrically ovate, apex acute to acuminate, awnless. *Lemma* Callus obconic relative to pedicel,  $\leq 0.3$  mm long abaxially, blunt, glabrate, articulation scar round, slightly excavated, peripheral ring raised. *Lemma Body* 2.2–3.8 mm long; profile broadly elliptical; margins symmetrically involute, juxtaposed parallelly with spikelet axis prior to anthesis, gaping in fruit; apex emarginate about excurrent midvein; rounded abaxially; germination flap absent; texture coriaceous at anthesis; veins 5–7; evenly antrorsely hirtellous throughout, trichomes simple,  $\leq 0.5$  mm long, colorless initially, aging tawny. *Lemma Awn* terminal, unbranched, straight or slightly arcuate, antrorsely scabridulous, 1.0–2.5 mm long; caducous. *Palea*



2.1–3.6 mm long; length, texture and vestiture subequal to lemma; profile broadly elliptical; margins planar; apex bifid, minutely biaristate; rounded abaxially; veins 2(3); disarticulating with respective lemma; abaxial epidermal pattern similar to lemma pattern. *Lodicules* three, free, adaxial pair obovate, 0.75–1.25 mm long, abaxial linear, 0.5–1.0 mm long. *Stamens* three; filaments free, evanescent to marcescent; anthers free, penicillate, 1.75–2.2 mm long, yellow. *Ovularium* obovate, glabrate; styles two, subterminal, free, short; stigmata two, exerted laterally, white. *Caryopsis* obovoid, compression dorsoventral, length ca. 2 mm long; enclosed within, but free from anthoecium; exocarp smooth and glossy; hilum linear, ca.  $\frac{7}{8}$  caryopsis length; endosperm solid; embryo F+FF,  $\frac{2}{5}$  to  $\frac{1}{2}$  caryopsis length. *Seedling* mesocotyl length; first leaf lamina narrow, erect, 7- to 15-veined. *Chromosomes* relatively small, 2–4  $\mu$  long,  $n=10$ ,  $2n=20$  (fruits from *Eno 17*, CAS),  $2n=20$  (fruits from *Eno 18*, CAS).

*Lamina Abaxial Epidermis* without microhairs or papillae; costal/intercostal zonation conspicuous; *costal regions*: short-cells solitary, paired or in short rows, silica bodies round, square, horizontally nodular-elongate, irregularly dumbbell- or saddle-shaped, hooks infrequent, central, medium, prickles infrequent, single file, small to medium, barb pointing toward blade apex; *intercostal regions*: long-cells elongated, mostly 75–150  $\mu$  long, walls moderately thickened, side-walls parallel, undulations moderate, U-shaped, end-walls angled or interlocking, distributed in alternating long-cell/short-cell files with occasional short-cell pairs, intercostal short-cells square, rectangular, or irregular, silica body shape similar to cell shape, stomata low-dome-shaped, arranged in single or double rows along costal zones, one or two interstomatal long-cells between successive stomata, these occasionally separated by square to rectangular short-cells; transverse section exhibiting prominent adaxial ribs, midrib generally indistinguishable from others; sclerenchyma abundant interior to both epiderms, forming ab- and adaxial vascular bundle girders.

*Lemma Abaxial Epidermis* achnatheroid, costal/intercostal zonation absent; microhairs absent; papillae absent; stomata absent; long-cells ca. 10–30  $\mu$  long, walls moderately thickened, side-walls irregularly undulating, end-walls irregular, arranged in files as long-cell/short-cell/long-cell, long-cell/short-cell/suberin-cell, or long-cell/prickle/long-cell; silica bodies horizontally oblong or squarish, ca. 5–10  $\mu$  long; silico-suberose couples occasional, suberin-cells crescentic, ca. 5  $\mu$  long; prickles 20–25  $\mu$  long, barb short.

*Paratypes*. USA, Idaho: Butte Co., Lemhi Range, ca. 35 km (air) NNW of Howe, Bunting Canyon above Badger Mine, 44°06'21"N, 113°07'48"W, T9N R28E S16 SW $\frac{1}{4}$ , 2255 m, 12 July 1979, S. & P. Brunsfeld 1132 (ID); *loc. cit.*, 16 June 1981, J. Civile 251d (ID); *loc. cit.*, 13 June 1987, L. Eno 6 (ID); *loc. cit.*, 26 June 1987, L. Eno 11 (ID); Lemhi Range, ca. 12 km (air) NNE of Howe, Middle Canyon, 43°53'30"N, 112°57'29"W, T7N R29E S26/35, 1950–2255 m, 17 June 1978, D. M. Henderson 4629, S. & P. Brunsfeld (ID, UTC); *loc. cit.*, 16 June 1981, J. Civile 260 (ID); *loc. cit.*, 10 June 1987, L. Eno 4, (ID); *loc. cit.*, 25 June 1987, L. Eno 9 (ID); Custer Co., Salmon River Range, Loon Creek ca. 500 m N of Bennett Creek Bridge, 44°47'34"N, 114°48'02"W, T17N R14E S22 SE $\frac{1}{4}$ , 1400 m, 18 May 1988, L. Eno 25 (ID); ca. 4 km (air) SE of Cougar Creek Ranch along Hood Creek, 44°43'38"N, 114°52'38"W, T16N R13E S16 NE $\frac{1}{4}$ , 2000 m, 20 June 1982, J. Civile 309 (ID); Loon Creek ca. 1.5 km NE of Tin Cup Campground, 44°36'41"N, 114°47'50"W, T15N R14E S26 NW $\frac{1}{4}$ , 1700 m, 2 July 1987, L. Eno 18 (ID); ca. 14 km (air) N of Challis, Morgan Creek Road ca. 5 km NW of US Hwy 93, 44°38'39"N, 114°12'32"W, T15N R19E S10 NE $\frac{1}{4}$  SW $\frac{1}{4}$ , 1600 m, 14 June 1987, L. Eno 7 (ID); Lemhi Co., Salmon River Range, Middle Fork Salmon River Canyon ca. 4.5 km N of Bernard Creek Guard Station, ca. 800 m S of Jack Creek confluence, 45°00'22"N, 114°43'14"W, T19N R14E S11 NW $\frac{1}{4}$ , 1150 m, 19 July 1982, J. Civile 335 (ID); ca. 55 km (air) NW of Challis, Middle Fork Salmon River Canyon at Camas Creek confluence, 44°53'31"N, 114°43'25"W, T18N R15E S16 SW $\frac{1}{4}$ , 1160 m, 15 July 1982, J. Civile 332 (ID); ca. 55 km (air) NW of Challis, Middle Fork Salmon River watershed, Camas Creek ca. 400 m E of Macarte Creek Camp, 44°53'03"N, 114°41'36"W, T18N R15E S22, 1200 m, 10 June 1982, J. Civile 289 (ID); *loc. cit.*, 19 May 1988, L. Eno 26 (ID); ca. 55 km (air) NW of Challis, Middle Fork Salmon River watershed, Camas Creek between Dry Gulch and Forage Creek, 44°53'30"N, 114°34'57"W, T18N R16E S15 SW $\frac{1}{4}$ , 1700 m, 7 July 1981, D. M. Henderson 5990 (ID); ca. 13 km WNW of US Hwy 93, jct Salmon NF Roads 045 (Iron Creek Rd) & 088 [*sic*, 046?], 44°55'20"N, 114°06'43"W, T18N R20E S4 NW $\frac{1}{4}$ , on quartzite cliffs, 3 July 1987, P. M. Peterson 4764 & C. R. Annable (ID, UTC); Salmon River Canyon, ca. 55 km N of Challis, US Hwy 93 ca. 500 m N of mile 279, 400 m SE of highway opposite Iron Creek, 44°53'00"N, 113°57'56"W, T18N R21E S15 SE $\frac{1}{4}$  SW $\frac{1}{4}$ , 1400 m, 14 June 1978, D. M. Henderson 4432 (ID); *loc. cit.*, 12 July 1981, J.

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FIG. 1. *Stipa shoshoneana*. a) habit; b) spikelet; c) floret; d) lemma abaxial epidermis; e) lemma callus; f) caryopsis, abaxial view; g) distribution of largest Idaho populations.

*Civille 276* (ID); *loc. cit.*, 21 June 1987, *L. Eno 8* (ID); *loc. cit.*, 28 June 1987, *L. Eno 13* (ID); Salmon River Range, Middle Fork Salmon River watershed, Loon Creek ca. 3 km NW of Falconberry Guard Station, between Mearney Creek and Burn Creek, 44°42'07"N, 114°46'41"W, T16N R14E S24 SW¼ NW¼, 1500 m, 6 July 1982, *J. Civille 330* (ID); Valley Co., Middle Fork Salmon River, W side ca. 1.5 km N of Golden Creek, Tombstone Rock, 45°09'44"N, 114°43'26"W, T21N R14E S15 SE¼ NE¼, 1025 m, 20 May 1988, *L. Eno 27* (ID); Nevada: Nye Co., Belted Range, N of Cliff Spring, 37°30'45"N, 116°05'15"W, T5S R53E S8, 2170 m, infrequent at cliff base, 18 June 1995, *F. J. Smith 3936 & J. Heers* (UNLV).

*Distribution.* *Stipa shoshoneana* is known principally from canyons of the Middle Fork of the Salmon River and from its eastern tributaries, Camas and Loon Creeks, extending ca. 160 km by air southeast to the southern Lemhi Range (Fig. 1). *Stipa shoshoneana* is also curiously disjunct near Cliff Spring in the Belted Range of south-central Nevada about 750 km by air southwest of the most southern Idaho population. This disjunction suggests possible presence in the intercalary ranges of eastern Nevada. Searches by Curto at some potential sites in the Jarbidge, Independence, Ruby, Schell Creek, Snake, White Pine, and Quinn Canyon Ranges of eastern Nevada found populations of *O. exigua* or *O. micrantha*, but no *S. shoshoneana* populations.

*Habitat.* *Stipa shoshoneana* is nearly always found within moist crevices of intrusive or extrusive igneous, metamorphic, or sedimentary cliffs and rock walls. Typical associate species include: *Heuchera grossularifolia* Rydb., *Ribes cereum* Dougl., *Potentilla glandulosa* Lindl., *Elymus spicatus* (Pursh) Gould, *Poa interior* Rydb., and *Poa secunda* K. B. Presl, with other taxa, such as *Pseudotsuga menziesii* (Mirb.) Franco, *Cercocarpus ledifolius* Nutt., *Artemisia tridentata* Nutt., *Amelanchier alnifolia* Nutt., *Glossopetalon spinescens* A. Gray, *Mimulus cusickii* (Greene) Piper, *Petrophyton caespitosum* (Nutt.) Rydb., and the east-central Idaho endemics, *Astragalus amnis-amissi* Barneby, *Cryptantha salmonensis* (Nels. & Macbr.) Pays., or *Draba oreibata* Macbr. & Pays., being locally common at some sites.

*Chromosome number significance.* *Stipa shoshoneana* plants possess the fewest chromosomes ( $2n=20$ ) of all North American Stipeae counted to date, and the second-lowest somatic number ever reported for the tribe; Prokudin et al. (1977) reported  $2n=18$  for *S. bromoides* (L.) Doerfler (as *Achnatherum bromoides* [L.] Nevski). Chapanov and Yurtsev (1976) reported  $2n=20$  for the Asian species *Piptatherum vicarium* (Grig.) Roshev., although all other reports indicate  $2n=24$  for this species, the common number of *Piptatherum* sect. *Piptatherum*.

*Epithet etymology.* The specific epithet refers to the Northern and Western Shoshone people whose ancestral lands encompass the entire known distribution of this species.

#### PHENETIC KEY

- 1 Styles fused proximally, persisting as a centric "beak" upon caryopsis; proximal glume length shorter than or equal to anthoecium length.
  - 2 Lemma awn 1–2.5 mm long, exerted subapically, straight or weakly arcuate, often absent on herbarium specimens; anthers glabrate or rarely penicillate distally; stigmata 2 . . . . . *Oryzopsis pungens*
  - 2' Lemma awn 3–8 mm long, exerted abaxially, recurved or geniculate at midlength, some usually present on herbarium specimens; anthers penicillate distally; stigmata 3 . . . . . *Oryzopsis exigua*
- 1' Styles free throughout, persisting as lateral "horns" upon caryopsis, or with no visible persistence; proximal glume length longer than anthoecium length.
  - 3 Anthoecium averaging  $\leq 3$  mm long, glabrate or sparsely antrorsely puberulent, trichomes adpressed . . . . . *Oryzopsis micrantha*
  - 3' Anthoecium averaging  $> 3$  mm long, evidently evenly antrorsely hirtellous to hirsute, trichomes deflexed.
  - 4 Ligule  $\leq 1.0$  mm long, longer laterally than medially.
    - 5 Palea  $\geq \frac{3}{4}$  lemma body length; lemma awn  $\leq 7$  mm long, contorted  $< 1$  revolution, weakly once-geniculate, caducous; primary panicle branches short, erectly adpressed to rachis at maturity . . . . . *Oryzopsis swallenii*
    - 5' Palea  $\leq \frac{1}{2}$  lemma body length; lemma awn 18–30 mm long, contorted  $> 1$  revolution proximally, twice-geniculate, persistent; primary panicle branches elongate, deflexed from rachis at maturity . . . . . *Stipa richardsonii*
  - 4' Ligule  $\geq 1.5$  mm long, acute to attenuate.
    - 6 Lemma awn persistent until fruit maturity or thereafter, 8–20 mm long, stout, once- or twice-geniculate, proximal segment distinctly spirally contorted; anthers glabrate . . . . . *Stipa canadensis*
    - 6' Lemma awn caducous, 1–2.5 mm long, straight or weakly arcuate; anthers penicillate . . . . . *Stipa shoshoneana*

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